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Otto Vogl. "Dietrich Braun" *Polymer News* 25.11 (2000): 374-375. Available at: http://works.bepress.com/otto_vogl/36

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Personalities in Polymer Science



Dietrich Braun

Honoring Professor Dietrich Braun on his 70th Birthday

Professor Dietrich Braun has played a leading role in teaching, research and application of polymer science in Germany in the last quarter of the century. In his position as the head of the German Plastics Institute and with his wide range of technical interests, Braun has influenced the governmental directions in polymer science. His achievements have made him a highly regarded member of the European and international science community.

Dietrich Braun was born on November 28, 1930 in Leipzig as the first son of Wilhelm Braun and Charlotte, née Quehl. He had one brother, Jürgen.

From 1937–1941 he attended Elementary School in Crimmitschau in Saxony, and went on to attend both Middle and High School in the same town, receiving his degree in 1949.

He then began his studies at the University of Leipzig but in 1951 transferred to the University of Mainz when the German Democratic Republic (East Germany) was declared and the Federal Republic of Germany (West Germany) was established. He studied chemistry with minors in physics and mineralogy and received his Ph.D. in 1955 from the University of Mainz with a thesis entitled, *Poly-p-bromostyrenes* under the direction of Professor Werner Kern.

In the Fall Semester 1960 Dietrich Braun became a Docent (Associate Professor) with a thesis entitled *Macromolecular Metallorganic Compounds: Poly-p-lithiostyrene, its Synthesis*

and Properties and became Associate Professor at the Technical University of Darmstadt, responsible for Organic and Macromolecular Chemistry.

In 1959, Dietrich Braun was appointed Head of the Department of Chemistry at the Plastics Institute of Germany, a position he held until his retirement. From 1969 he also was the Director of the entire Plastics Institute. Since 1977 he was also Full Professor at the Technical University of Darmstadt, responsible for Organic and Macromolecular Chemistry.

After receiving his Ph.D., Braun started his important investigations on Polymer Reactions and Polymer Reagents. The first category was based on the highly reactive organolithium polymers, which were obtained by reacting poly-p-iodostyrene with butyllithium. Poly-p-lithiostyrene was later used as a polymeric reagent.

At the same time investigations were started to prepare stable polymer radicals. Polyphenylpicrylhydrazyl was not only the first stable polyradical, but it could also be used for the behavior of polymers in dilute and concentrated solutions. These successes were followed with investigations on stable polymeric oxygen, nitrogen and carbon radicals, which opened the field of polymeric reagents and functional polymers into neutral polyradicals, in addition to the already established charged and reactive polymers.

After Dietrich Braun joined the German Plastics Institute he turned his attention to more practical problems and began investigating reactions that occurred during the fabrication of plastic materials. His first target was work on poly(vinyl chloride) (PVC). He investigated extensively the dehydrochlorination of PVC, its mechanism and initiation, and the stabilization of PVC. As glass fiber reinforced polyamides were introduced, the German Plastics Institute also became involved in a new type of the fabrication and wear of plastics during processing.

A substantial portion of Braun's research activities was involved with radical polymerization. A significant part was initiation with highly substituted ethanes. This type of radical initiation and polymerization was a precursor of the now highly proclaimed "living" radical polymerization. Another important part was the polymerization of vinyl compounds caused by hydrogen transfer with benzpinacol. It was the basis of a series of papers on the light induced polymerization in the presence of hydrogen donors.

Investigations of binary and ternary copolymerizations also played a substantial part in the research effort. These were conducted in cooperation with F. Tüdös and T. Kelen. Special attention was paid by Braun to co- and

terpolymerizations of monomers that are not capable of homopolymerization.

In the 1960's Braun started his research on intermediates of phenoplasts and aminoplasts. This work required the development of chromatographic methods for the characterization of such resins. Investigations of the structure of polymers in solution and in the solid state were also undertaken. In this work for the first time liquid crystalline polysulfones were studied. At the same time, polymer networks and the interpenetration in network systems were investigated.

In the early 1970's Braun started investigations on polymer blends. A number of papers were published regarding the miscibility of polymers and the phase behavior of multi-component systems.

Another area of Braun's interest was research of the utilization of polymers from renewable sources. For example thermoplastic polymers from cellulose and starch as well as from sugar derivatives. More recently, a duroplast was produced based on blends of gelatin and linseed oil.

His work was published in about 500 papers, reviews, and book chapters.

In his extensive work in many fields in the German Plastics Institute and as Professor at the Technical University of Darmstadt, Dietrich Braun had numerous coworkers. He supervised 130 Ph.D. dissertations and 170 master theses. He broadly emphasized macromolecular chemistry in its entirety, from synthesis to physico-chemical behavior and to fabrication, in order to provide his students and coworkers with the full appreciation of polymeric materials.

Braun has taught hundreds of students in macromolecular chemistry. Very early in his teaching activities, he stressed the importance of laboratory courses as the basis of the training in macromolecular chemistry which was reflected in the publication of his famous book on Laboratory Practices.

Dietrich Braun was also very active in scientific literary activities. He was the Editor of "Die Angewandte Makromolekulare Chemie" from 1967–1999 and on the Editorial Board of a number of Journals: "Die Makromolekulare Chemie", Kautschuk, Gummi & Kunststoffe, Polymer Materials and Polymer Testing. He also was the co-editor of the Plastics Hand Book and published (with H. Cherdon and W. Kern) a "Praktikum" of Macromolecular Organic Chemistry, which is now in its 4th Edition and has been translated into Spanish, Russian, Korean, English and Japanese.

With his impact on polymer science in Germany and world wide, Dietrich Braun received a number of Honors and Awards. In 1990 he was awarded an honorary doctoral

degree from the Kossuth Lajos University in Debrecen, Hungary; in 1986 he was appointed Adjunct Professor at Tongji University in Shanghai, China. He received the Herman F. Mark Medal from the Austrian Research Institute for Chemistry and Technology, Vienna, Austria in 1988, was elected an Honorary Member of the Research Society of Plastics in Germany. In 1979 he received the Award of the Division Plastic Foams of the Society Plastics Fabricating Industry, in Frankfurt, Germany.

Over the years, Dietrich Braun has been very influential in German professional societies and scientific and technical Institutes.

In professional societies, Braun was a Member of the Board of the Division Macromolecular Chemistry of the German Chemical Society from 1971-74, the Board of the Society Plastics Technology, Düsseldorf from 1973-1985, and a Member of the IUPAC Commission on Macromolecular Nomenclature from 1982-1990. Since 1983 he is the German representative for the "Dumbe Discussions".

Since 1969 Dietrich Braun is a Member of the Supervisory Board of the Research Institute of Pigments and Lacquer, and the Working Group of Industrial Research Organization, Cologne. From 1972-1990 he was a Member of the Wilhelm Kluditz Institute for Wood Research in Braunschweig, from 1979-1995 of the Federal Institute for Research and Testing of Materials, in Berlin, and from 1982-99 of the Information Center for Chemistry in Berlin. Since 1983, he is a Board Member of the South German Plastics Center, Würzburg.

From 1985-1993, Dietrich Braun was the Head of the Evaluation Group of the German Ministry of Research and Technology of Research Projects for Materials and, since 1986, he is Co-chairman of the Plastics Museum Association in Düsseldorf.

Since 1970, Dietrich Braun has been a Member of the working party on "Polymerization Kinetics" of DECHEMA. He is also much used as an expert witness; since 1973 he served the Association of Industrial Research Organization, in Cologne, and from 1976-1980 and 1988-1996 the German Research Foundation, in Bonn.

Dietrich Braun is an enthusiastic cyclist; he has ridden to his Institute on his bicycle almost every day since 1969 and has accumulated, over 40,000 miles of this type of commuting. He also enjoys Golf and is an accomplished photographer. He is also a Member of the Lions Club.

In 1960, Dietrich Braun married Margarete Jacobi. They have 2 daughters: Bettina who is a Medical Doctor and Barbara who is an Economist.

This article was prepared by Otto Vogl, Herman F. Mark Professor Emeritus, Department of Polymer Science and Engineering, University of Massachusetts, Amherst, MA, 01003-4350, U.S.A.